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P A P E R S

I N

M E C H A N I C K S.

R

M E C H A N I C K S.

The Sum of TWENTY GUINEAS was this Session voted as a Bounty to Mr. JOHN WEBB, of Dorrington-Street, London, for his Improvement of a Gun-Lock, which is likely to prove of considerable advantage to Society, by preventing the numerous accidents that arise from the unexpected discharge of Fire-Arms; a Plate and Description of which lock are annexed, and a complete Model reserved in the Society's Repository.

S I R,

I HAVE taken the liberty of sending to the Society an invention of mine, to prevent the accidents which frequently attend the use of Fire-arms, and which may be applied to the Gunlocks now in common use. It is con-

R 2

trived

trived on such a principle, that when it is on full cock, and the trigger pulled in the common manner, it returns to the half cock only, unless, at the same time that the trigger is pulled, the pressure of the thumb is applied on a spring placed upon the butt or stock of the gun; in which case it gives fire in the usual manner. The intent of this invention is to guard against the casualties which arise when Fire-arms are left loaded, or the misfortunes which frequently happen from twigs of trees or bushes catching the trigger when sportsmen are passing through hedges.

I hope it will meet the approbation, and encouragement of the Society, and am,

SIR,

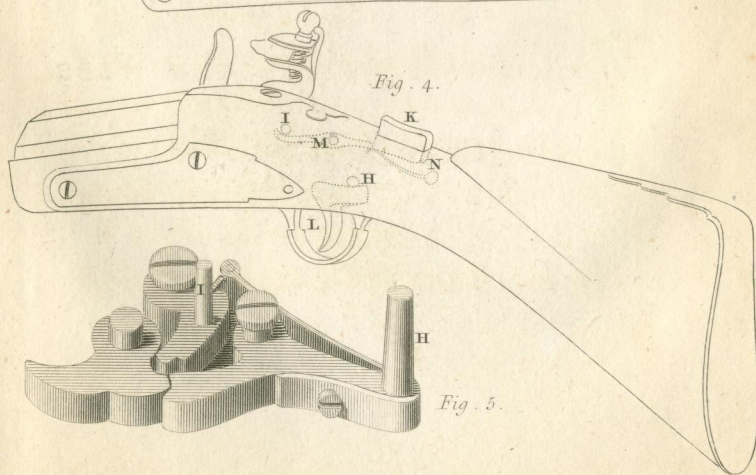
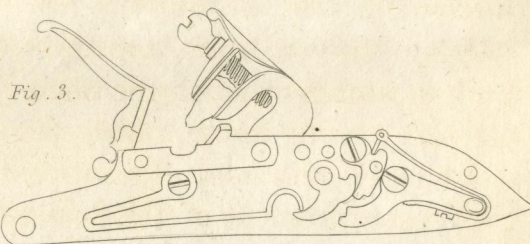
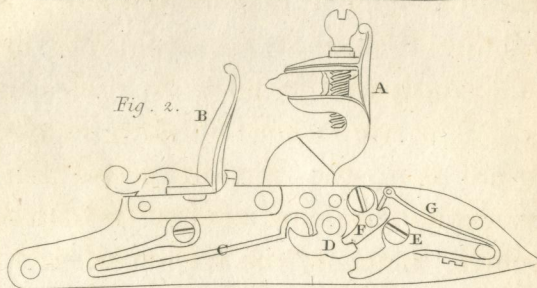
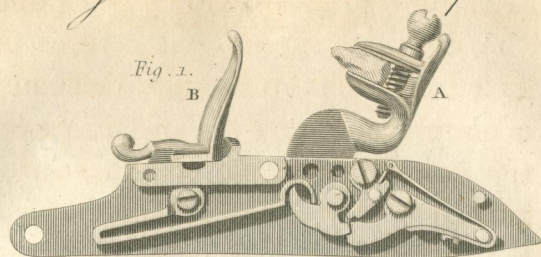
Your humble Servant,

JOHN WEBB.

TO MR. CHARLES TAYLOR.

Mr John Webb's Gun Lock
for preventing Accidents in the use of Fire Arms.

PL. II.



Drawn by J. Malton.

Engraved by W. Lowry.

DESCRIPTION of Mr. JOHN WEBB'S
Gun-Lock, Plate II. Fig. 1, 2, 3, 4, 5.
The Letters of the several Figures
correspond together in the general De-
scription.

A is the cock—B, the hammer—
 C, the main spring—D, the tumbler—
 E, the large sear—F, the small sear—
 G, the sear spring—H, the shank or arm
 of the large sear—I, the shank or arm
 of the small sear—K, the thumb-piece
 —L, the trigger—M, the lever of the
 thumb-piece—N, the spring which holds
 the thumb-piece up, when not pressed
 upon by the thumb.

Fig. 1, is an interior view of the lock
 at full cock.

Fig. 2.—The same lock at half cock.

Fig. 3.—The lock when down.

Fig. 4.—The lock fixed in the gun-
 stock, in order to show the thumb-piece

R 3

K and

K and the trigger L, with their mode of action. When the gun is held cocked in the usual manner, ready to fire, and the trigger L is pulled by the finger, the thumb, being pressed at the same time on the piece K, raises, by means of the lever M, moveable on a pin in its centre, the shank I of the small sear, and admits the cock to give fire as in the common way; whereas, if only the trigger L is pulled, the lock stops at the half-cock I; further motion being prevented by a notch in the small sear. A spring, N, screwed to the stock, returns the thumb-piece to its place, when the thumb is taken off.

Fig. 5 shows, on a larger scale, the construction of the tumbler, large and small sears, the sear-spring, and the manner in which they rise out of the bents of the tumbler.

The

THE SILVER MEDAL was this Session presented to Mr. RICHARD KNIGHT, Ironmonger, of Foster-lane, Cheapside, for his method of BREAKING-UP LOGS of WOOD, for the purposes of Fuel, by blasting them with Gunpowder. The following Accounts and Certificates were received from him, a Drawing of the Apparatus is hereunto annexed, and the Implements are placed in the Society's Repository.

S I R,

I HAVE frequently observed the great difficulty, labour, and loss of time experienced in Breaking-up Logs of Wood, particularly for the purpose of fuel; such as the stumps and roots of large trees, which remain after the felling of timber, many of which, especially such as consist of the harder and

R 4

more

more knotty kind, as oaks, elms, yews, etc. are frequently left to rot in the ground, in order to avoid the necessary expense of breaking them to pieces in the common way, which is generally effected by the axe, and driving a succession of iron wedges with a sledge hammer ; a laborious and tedious process. Sometimes gunpowder is used, by setting a blast in a similar way to that in mines or stone-quarries. This method, though less laborious than the former, is tedious, is attended with several difficulties, and requires considerable experience and dexterity, or the plug will be more frequently blown out than the block rent by the explosion. With a view, therefore, to obviate these difficulties, I have constructed an instrument, a sketch and description of which I now inclose for your approbation. The simplicity of its construction and application is such as almost to preclude an idea of its originality ; but as it has
hitherto

hitherto appeared entirely new to all my acquaintance, and as I do not know that any thing of the kind has ever before been presented to the Public, I am induced to think it may not be unacceptable; and should it appear to you an object worthy the attention of the Society of Arts, I shall be happy in making it public through a channel so highly respectable; and will, immediately on being favoured with your opinion, transmit to the Society a complete instrument with the necessary appendages, and a more minute description of its mode of application.

I am, SIR,

Your obedient humble Servant,

RICHARD KNIGHT.

*Foster-lane,
March 16, 1802.*

MR. CHARLES TAYLOR.

The

The inclosed Drawing represents the Instrument, which consists simply of a screw A, with a small hole drilled through its centre. The head of the screw is formed into two strong horns, for the more ready admission of the lever by which it is to be turned.

B represents a wire, for the purpose of occasionally clearing the touch-hole. When a block of wood is to be broken, a hole is to be bored with an auger of a proper depth, and a charge of gun-powder introduced. The screw is to be turned into the hole, till it nearly touches the powder; a quick-match is then to be put down the touch-hole till it reaches the charge. The piece of quick-match is about eighteen inches in length, which affords the operator an opportunity of retiring, after lighting it, to a place of safety.

The quick-match is made by steeping a roll of twine or linen thread in a solution of saltpetre.

DESCRIPTION

DESCRIPTION of the Engraving of
MR. RICHARD KNIGHT's Method of
Blasting Logs of Wood. Plate III.—
Fig. 1.

S I R,

AS it may probably be a greater satisfaction to the Society to see the Instrument itself (a sketch of which I sent you last week, for the purpose of rending timber, logs of wood, etc, etc.) I now inclose a complete one, together with the necessary apparatus for its application, and of which I solicit the Society's acceptance.

The following are the Articles inclosed.

A, the rending or blowing screw, with a wire B, for the purpose of occasionally clearing the touch-hole, previous to the introduction of the quick-match.

C, an

C, an auger proper to bore holes, to receive the charge of the screw.

D, a gouge, to make an entrance for the augur.

E, a lever, to wind the screw into the wood, with a leather thong F attached to it, in order to fasten it occasionally to the screw, to prevent its being lost, in case it should be thrown out when the block is burst open; a circumstance which does not often occur: for in all my experiments, when the wood has been tolerably sound, I have always found the screw left fixed in one side of the divided mass.

A roll of twine is to be steeped in a solution of nitre, for the purpose of a quick-match, or train, to discharge the powder, by thrusting a piece thereof down the touch-hole, after taking out the wire B.

The first that was made was for
J. Lloyd, Esq. of St. Asaph, the late
Member

Member for Flint, who, having a great quantity of timber on his estate, considers it a considerable acquisition ; and at Overton-Hall, last summer, spoke so favourably of it, in my presence, to Sir Joseph Banks, that he immediately sent for his smith, and requested I would give him the necessary instructions for making one ; but as I left that part of Derbyshire soon after, I had not an opportunity of seeing it finished. Since my return home, I have had several made, similar to that which I now present to the Society, which are better finished, and have sharper threads than smiths in general have an opportunity of giving them. Should the Society want farther explanation, I shall very readily wait upon them, if required, for that purpose, and remain,

Your very humble Servant,

RICHARD KNIGHT.

*Foster-lane,
March 24, 1802.*

MR. CHARLES TAYLOR.

DEAR

DEAR SIR,

AFTER you left us last autumn, at Sir Joseph Banks's, his smith, who is a remarkably good workman, bestowed much needless time and trouble in making a blasting-screw; for he finished it in the highest style of polish, and, I think, made the thread of the worm too fine, or at least finer than was needful. However, it answered most completely, and very much to Sir Joseph's satisfaction, who lamented he had not seen such a contrivance many years ago, when a relation of his used to amuse himself with splitting the roots of trees, etc. in the common way. I have used the *Blasting-screw*, for so I shall call it, all the last and preceding winter, with the greatest success, and have gained many loads of fuel, which otherwise would have been suffered to rot, as the expense and labour in clearing the roots in the ordinary way renders the fuel

so

so procured too expensive; and since I have had the screw, I have observed some hundreds of roots in a rotting state in other places, from the want of knowing that there was such a contrivance as the screw. I think you would serve the public in no small degree, by devising some method of making its use known to the world.

When I was at Overton, some pieces of very tough, knotty, close-grained oak were picked from the timber-heap, for the use of the Gregory lead-mine, by Sir Joseph Banks's direction, and the screw severed some pieces four or five feet in length, and nine or ten in diameter, throwing them some feet asunder, to the surprise of the miners, who were assembled on the mine-bank. Sir Joseph took the screw with him to Revesby-Abby, in Lincolnshire, where, I understand, he had some large roots, that had lain by many years as useless; and I dare say he will give you a good account,

account, and bear testimony to the utility of the invention. We have used it without a single accident; but my neighbour, Lord Kirkwall, having procured one to be made by that which I had from you, one of his servants, in his Lordship's absence, I presume, put too much powder into the hole, and the screw was blown as high as a one-pair-of-stairs window, and passed through it into an apartment where a person then happened to be, but without any farther mischief than the loss of a pane of glass. Any one who uses the instrument will soon learn what depth of screw will be sufficient to split any root in proportion to its strength, taking care that the screw has sufficient hold to resist the force of the gunpowder, before the root is cleft. I think much powder may be saved by using a cotton match, impregnated by a solution of saltpetre, or any of the combustible matters generally made use of in fire-works; and by the
use

use of the cotton the hole through the screw may be lessened, which will add to the action of the confined powder; though a straw filled with powder, in the manner in which the miners use it, answers very well. Should any one be timid in using the screw, a chain or rope may easily be attached to the screw, and that fixed to any log, or fastened to a stake driven into the ground. If wood is rotten, the screw cannot act. I assure you, that when I go abroad, I constantly see great quantities of roots in a rotten state, about almost every farm-house, which would not be the case if the utility of the instrument were made public.

I am

Your much-obliged Friend

And humble Servant,

J. LLOYD.

Wygfair,
March 26, 1802.

TO MR. RICHARD KNIGHT.

S

A Bounty

A Bounty of TEN GUINEAS was this Session voted to Mr. JAMES WOART, of Fulham, for his Invention of a METHOD TO SECURE FROM DANGER TIMBERS OR GIRDERS, injured by the Dry-rot, or by Time. Models on his plan are reserved in the Society's Repository for the inspection of the Public. Descriptions and two Plates of them are here annexed.

S I R,

THAT part of the Model I have sent herewith, which has moveable Iron Levers or Braces, *Plate III. Fig. 2*, represents the method I have employed, at the House of Hennege Legg, Esq. at Putney, in Surry, to support the Girders or Beams where their ends or bearings were entirely destroyed. Had the iron braces not been put in execution, new Girders must have been inevitably introduced, for reasons hereafter noticed. The bearing is not less than twenty-nine feet. The roof must have
been

Perspective View of Mr. Woark's method of supporting Timbers.

Pl. III.

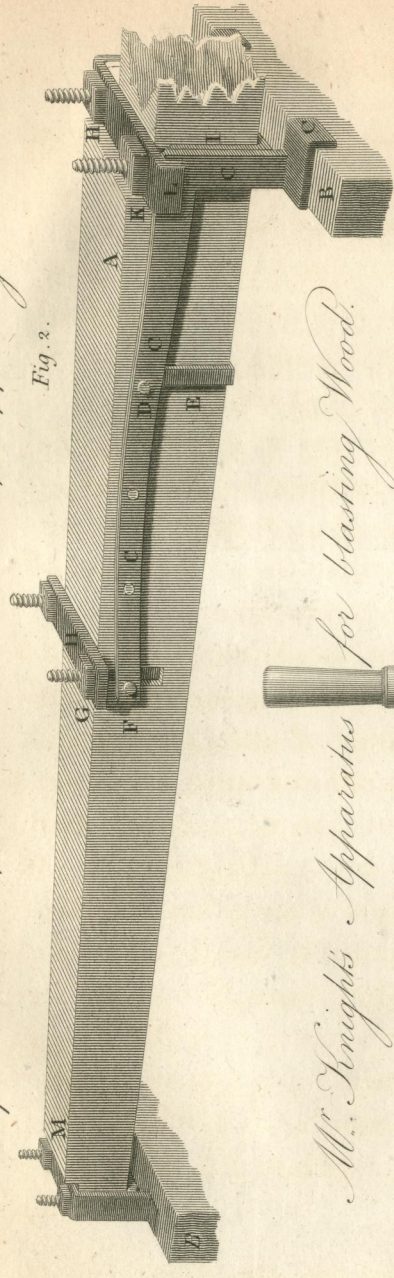


Fig. 2.

Mr. Knight's Apparatus for blasting Wood.

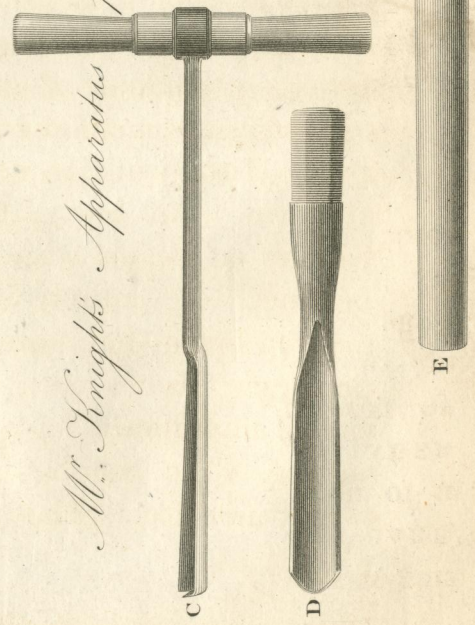
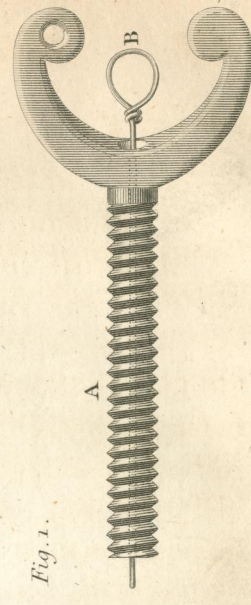


Fig. 1.



J. Malton del.

Lowry sculp.

been completely taken off, owing to the gutter-plate being placed across the girders, and the roof a double one.

The ceiling of the drawing-room, which is immediately under the Girders, must also have been destroyed.

This ceiling is highly ornamented, and supposed to be in value five hundred pounds, to which sum if the expense of taking off the roof, etc. is added, it would have cost eight hundred pounds to have reinstated the work; whereas, I believe, that the iron braces and workmanship in effecting this business, on my plan, did not amount to twenty pounds, for securing the four ends of the Girders, the ceiling, and the roof.

If my plan is approved of by the Society, I trust to their liberality for reward. I am, SIR,

Your humble Servant,

JAMES WOART.

Fulham,
Nov. 25, 1801.

MR. CHARLES TAYLOR.

DESCRIPTION *of the Engravings of*
Mr. JAMES WOART's Inventions for
securing Beams of Timber, decayed by
time or injured by the dry rot.

Plate III. Fig. 2; and Plate IV.

Fig. 1, 2, 3, 4. 5, 6, 7.

Where the ends of the girder are decayed by time, or injured by the dry rot, they are often taken out, and new ones put in their place, at a great expense; and if the dry rot is in the walls, the ends of the new girder will be in danger of it again: such was the case at Eltham, in Kent, where in one house there were three new girders to one floor in the space of twenty years; whereas my method will be found infallible, executed at much less expense, and not subject to the dry rot, because the end of the girder may be cut off clear from the wall; and if an air grate is put on the outside, so as to admit air
to

to the end of the girder, it will remain safe from injury.

Plate III. Fig. 2.—A, shews the end of the decayed girder, with the braces applied upon it.

BB, the templets or wall-plates on which the Girder rests.

CCCC, one of the iron levers for raising and supporting the girder (there being a similar one on the opposite side). This lever is moveable on a pin D, which comes through a hole in the lever, distant about two feet from the end of the girder. This pin forms part of a collar E bedded in the girder. The lever is six feet long, three inches wide, and three fourths of an inch thick, and extends from the wall-plate along the side of the girder.

The extremity of the lever is moveable on another pin F, projecting through it from an upright iron G, bedded in the side of the girder, and carrying a nut and screw, which act on a cross plate H, through which the upright iron passes.

At the other end of the lever, next the templet, is an iron collar I, bedded in the girder, which collar may be raised or lowered at pleasure, by means of the nut and screw K, forming part of it; and by aid of the cap-plate L, which presses upon the lever, and also clasps it to the girder by its bend at L.

As the *Plate III. Fig. 2*, shows only one side of the girder, and, as has been before observed, there being also a similar lever on the opposite side of the girder, their separate parts, method of connecting them, and their mode of action, are more fully explained in *Plate IV. Fig. 1, 2, 3*, where the same letters are made use of to point out the several parts.

Fig. 1.—E, shows the whole of the collar to be bedded in the side and bottom of the girder, and the pins DD, on which the two levers are moveable.

Fig. 2.—The cap-plate H, the two upright irons GG, with their nuts and
screws,

screws, which act upon the extremities of the two levers by means of their pins FF.

Fig. 3.—The collar I, on which that end of the girder next the templet rests, the sides of which collar are bedded in the girder. CC are the claws or bended legs of the two levers which go into the templet. L is the cap-plate, KK are the nuts and screws.

At Mr. Legg's house, where the levers above mentioned were applied, the beams of the roof were so decayed that the roof was in imminent danger, the bearings were entirely rotten, and the beams were sunk three fourths of an inch, and pressing against the wall for support; if there had not been a large cornice underneath, supported by brackets, the whole roof must have fallen.

To put them in order, I first put shores or supports under each end of the two beams, on which the double roof lay, and then forced the four shores at once,

for the security of the roof, the work, and men. The iron levers, C, were then prepared, let into the templet, and fixed on each side of the beam, on the pins D, projecting from the collar E, bedded in the beam, about two feet from its end. When the whole apparatus was ready, on screwing the nuts on the upright irons G, at the extremity of the levers, the beam was raised to its proper height with great ease, although it was supposed there was above two tons weight on each beam, on account of the lead gutter, and gutter-beam betwixt the double roof, and the rich ornamented ceiling attached to the joice, which was not the least destroyed except where the iron-collar E was fixed, which was put up from the under side by cutting the ceiling the width of the collar. These beams were so decayed, and so hollow, that the common method of bolting plank on each side of the beam would not have been safe; and if it could have been

been executed, the new planks would have been subject to the dry rot, and the roof still in danger, which is now prevented, as the iron is not affected by it. The beam-ends were cut clear from the walls, and the beams are suspended by means of the iron levers, whose feet rest on the templets of the walls. An air grate was made, on the outside of the wall, to admit a current of fresh air to the ends of the timbers. The roof is now much safer than when originally made, as the timber is secured from decay; and, owing to the collar E, the bearings are now two feet shorter at each end of the beam; the bearing on each beam being now, in the whole, four feet shorter than in its original state.

After the beams were brought to their proper height, and the levers and screws adjusted, screw-bolts were put into the timber, through holes purposely left in the lever, betwixt D and F, and the whole work thus perfectly secured.

At

At the other end of the Girder M, Plate III, is shown another method of supporting Timbers, where the ends are decayed.

The particular irons used in this way are shown in *Plate IV. Fig. 4.* N is a collar for the girder; O, an iron frame which rests on the templet; PP, two nuts which raise the collar N. RR show the clawed ends of the two bars of iron, extending under the girder, bedded therein, and screwed to it at their extremities, about five feet distant from the templet.

Fig. 5, is one of the iron bars last mentioned.

S is the claw or lap which projects over the collar N.

T is the place where it is screwed into the girder.

Fig.

Fig. 6 and 7. Plate IV. explain a third method of securing decayed Timbers.

Fig. 6, gives a side-view of a decayed girder: *a*, represents the templet; *b*, an iron lever, six feet long, nearly strait, being only cambered one inch, three inches wide, and three-quarters of an inch thick; this lever extends along the side of the girder *c*, and is secured firmly to it by the side-irons *d d d d*, which are two inches wide, and full half an inch thick, pointed at the ends. The higher ends of these side-irons are driven into the girder, and the lower points pass through holes in the lever, into the lower part of the girder, and are held close to the girder by staples *e e e e*: the side iron next the templet may be fixed slanting, in order that it may enter sounder wood. A claw, *f*, which is part of the lever, rests on the wall-plate *a*, and is bedded in it; an iron plate, *g*,
lying

lying under the girder and let into it, passes through the lever at h, connecting it with a similar lever on the opposite side, and which assists in the same way to support the girder: i, is a flooring joist, to show how deep the levers are inserted therein.

Fig. 7, shows the under part of the same girder; b b, are the bottoms of the two levers above mentioned, fixed to the girder by the side irons and staples before described; k k, the broad feet of the levers which lie flat upon the wall plate; ff, the two claws projecting from the feet, in order to bed in the wall plate; iiii are joists, partly cut through, to admit the iron levers to lie close to the girder: g shows the iron plate or collar on which the Girder bears; it is turned up an inch and a half at each end, to keep the levers close to the sides of the girder. This collar should be made out of inch-bar iron, with points projecting from it, in the same manner as the collar

collar at D D, *Fig. 1*, to connect it with the levers, by passing through holes made through them for that purpose.

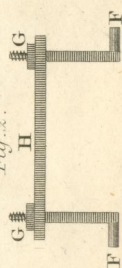
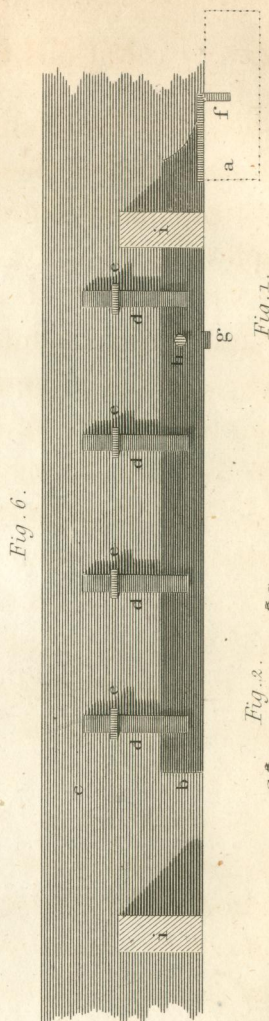
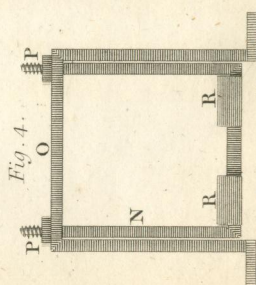
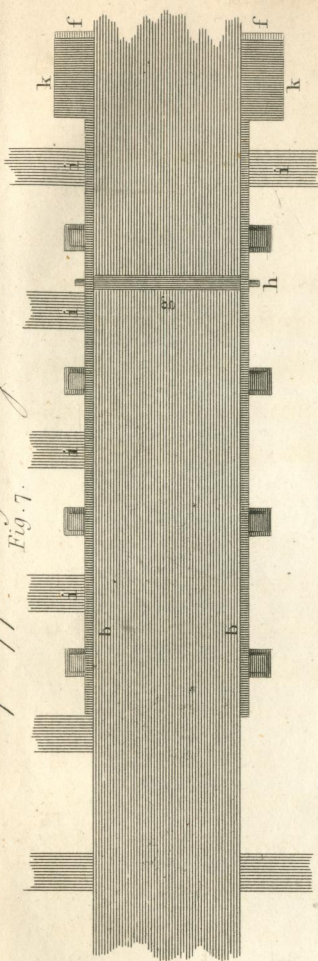
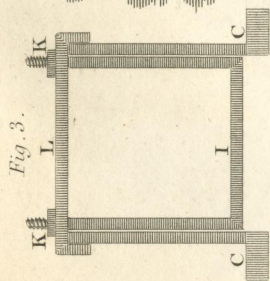
To fix the levers, put a shore two feet six inches from the wall, under the girder, to support it; then cut off the decayed end, and take out the templet, or part of the wall plate if decayed; and put in a stone templet for the irons to rest upon, with mortices in the stone to admit the claws of the lever: then fit the collar underneath the girder, two feet from the wall, to answer the holes in the lever; make an incision in the joists three-fourths of an inch wide, and three inches deep, to admit the levers; fix the levers on each side with the collar, so as to force up the levers together; then with slight shores force up the ends of both levers together, and fix the side-irons firm. The girder will thus be perfectly safe.

The templet or wall plates, on which the levers rest, are made of Portland stone,

stone, three feet long, nine inches wide, and five inches deep, with incisions or mortices made therein for the claws of the levers.

Certificates, confirming Mr. Woart's Improvements, were received from the Commissioners of the Navy, from Mr. Joseph Harris, smith, at Putney, and Mr. George Smith, surveyor, at Putney.

Mr. Weir's method of supporting decayed Timbers.
FIG. 7.



Lowry sculp.

THE GOLD MEDAL, or ONE HUNDRED POUNDS, at the option of the Candidate, being the Premium offered for the Discovery of a QUARRY OF MILL-STONES, equal to those known by the name of French Burrs, was this Session adjudged to Mr. JAMES BROWNHILL, of Alloa-Mills, near Stirling, in Scotland; who made choice of the Pecuniary Reward. The following Accounts and Certificates were received relative to these Mill-stones.

SIR,

AMONG the various premiums offered by the Society for the Encouragement of Arts, etc. I observe that there is one for the person who shall discover, in Great-Britain, a Quarry of Stone fit for the purposes of Mill-stones, for grinding Wheat, and equal
in

in all respects to that known by the name of French Burr. I have therefore taken the liberty of inclosing a particular account of the execution of a pair of those Mill-stones, which have been lately built at my Mills here, compared with the execution of the Burr-stones. The Mills are on a large scale; and the Alloa-mill Company, who carry on an extensive business, pay a high rent for them.

They have a very intelligent industrious man for their head miller, who, in consequence of the high price of French Burrs, and the very great difficulty of procuring any of them at present, was very anxious to try if any substitute could be found; and he flatters himself that he has been fortunate enough to find some Stones, in this neighbourhood, that will answer equally well as the French. Their performance has been such, that two other pair are bespoke; and in all probability many
more

more will be built before the time proposed for laying the discovery and claim before the Society. Should the discovery answer the present expectations, the Society will rejoice to find that the situation of the Quarry is so near this port, where any quantity of the rough stones, or in their more perfect state, can be easily transported to any place accessible by water-carriage.

I am, SIR,

Your most obedient humble Servant,

T. F. ERSKINE.

*Tower of Alloa, Clackmananshire,
June 24, 1800.*

MR. CHARLES TAYLOR.

T

On

On the 20th of June, 1800, ground twelve Quarters of Wheat of three different qualities; six Quarters were ground on French-burr Mill-stone, and six Quarters on Mill-stones built of the Stone from Abbey's Craig, in Stirlingshire.

Qrs.	Bush.	Sks.	Cwt.	Qrs.	lb.	lb.
1	4 of Wheat	53 $\frac{1}{4}$	lb. Avoid.	per Bush.	—	645
2	.. Do.	57 $\frac{1}{4}$	.....	.....	—	924
2	4 Do.	56	.....	.....	—	1120
<hr/>						
6	Qrs.	..	..	..	..	2689

Produce of the above six Quarters, per French Burrs.

Of fine Flour.....	5	—	2	20	1476
second do.....	—	2	—	3	227
third do.....	1	—	2	9	345
<hr/>					
Bran	7	—	3	4	2048
Waste	—	4	3	17	549
	—	—	—	—	92
<hr/>					
Weight as above..	..	..	..	..	2689

N. B. The Bran, measured with the Winchester bushel, and struck, turned out 26 bushels. Ground in three hours and forty minutes.

Ditto per Abbey Craig Mill Stones.

Of fine Flour.....	5	1	2	27	1595
second do.....	—	2	—	19	243
third do.....	—	2	—	20	244
<hr/>					
Bran	7	1	—	10	2082
Waste	—	4	2	14	518
	—	—	—	—	89
<hr/>					
Weight as above..	..	..	..	..	2689

The Bran measured 32 bushels, although 31 lb. lighter than that produced by the French Burrs. Ground in three hours and ten minutes.

Each

Each mill-stone is about twenty-five hundred weight, six pieces in the bed, and fourteen in the runner, four feet and a half diameter, eleven inches thick at the hem, and thirteen at the eye; each stone, divided into nine spaces, having ten circular roads in each space: they flag the bran, and do not heat the flour so much as French Burrs, being much evener in the face than the latter. I have ground four hundred quarters with them, and they have required but little dressing during the grinding of that quantity; but there is very little taken off them, as they are very hard.

A Certificate from James Brownhill, dated Alloa, January 16, 1801, declares that the Quarry, from which these stones are taken, is situated about a mile north-east from the Castle of Stirling, named Abbey Craig; and that it is a huge mass of whinn-rock of various texture, and strikes fire with steel; that the pair of stones sent to the Society are the first

that were made, and have ground about a thousand quarters of wheat to the satisfaction of the bakers.

It also states, that five quarters of wheat were ground with them in a hundred and eight minutes, the stone making one hundred and thirty-one revolutions per minute; heat of the flour 64° Fahrenheit's thermometer. The stone being of a uniform hardness, executes its business better than the French Burr-stones.

The produce of the above five quarters of wheat, 60lb. per Winchester bushel, 2400lb. lb.

Produced fine Flour	1464
second do.	222
third do.	241
	<hr/>
	1927
Broad bran 242 }	442
Small do. 200 }	
	<hr/>
	2369
Waste. . .	31
	<hr/>
	2400

These

These stones cost about twenty guineas per pair, and, when first made, weighed nearly twenty-five hundred weight each. They require to be somewhat oftener dressed than French Burr-stones; but the time which is lost in dressing is more than compensated in the after execution. Taking in the time for dressing, these stones have, on an average, ground thirty-six quarters in twenty-four hours.

A letter from Mr. Erskine, dated January 3, states, that many bakers, from Glasgow and Paisley, have preferred the flour made from these stones, to that ground by the French Burr. It also states, that the place from whence these stones were taken, is situated near Stirling, close on the banks of the Forth, called the Abbot's Craig. It is a particular kind of that stone which is known in this county by the name of Whinn-stone, which resembles the stones from Aberdeen, but is of a more open

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texture.

texture. There is reason to believe that stones of the same kind are to be found in various parts of Scotland; which Mr. Erskine flatters himself the Society will think enhances the discovery of James Brownhill.

A certificate from Andrew Lind, and G. Younger, bakers, dated January 16, 1801, certifies, that the flour ground by these mill-stones was equal in every respect to that ground by French Burr-stones.

A letter from John Burns, mill-stone builder, states, that he has been long employed as a builder of French Burr-stones, and that he has now been six months engaged in making mill-stones from Abbey Craig, which he has employed, and which make excellent work.

A letter from Mr. Erskine, dated January 17, 1801, confirms the above circumstances and signatures.

A letter from Mr. Erskine, dated April 7, 1801, informs the Society, that
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he had forwarded for their inspection, samples of flour ground by the Alloa Mill-stones, and other samples ground by French Burr-stones, for comparative experiments. The Committee found those ground by the Abbey-Craig Stones to be the best.

A letter from William Glenn, dated Lithgow Mills, December 11, 1801, states that he was so well pleased with the mill-stones which he had procured from Abbey-Craig, that he had ordered another pair, and should leave off French Burrs entirely.

A letter from John Cowan, dated Hawk-head Mill, December 16, 1801, speaks highly in favour of the Abbey-craig Mill-stones, in comparision with the French Burr.

W. Crawford, in a letter, dated Bainsford Steam-engine, January 7, 1802, declares, that he has no hesitation in attesting that he considers the Abbey-craig Mill-stones to be superior to

French Burr-stones for flour-manufacture; that, although they require to be oftener dressed than Burr Stones, they will grind considerably more wheat in a given time, upon an equal power; and that he considers them an invention highly beneficial to this Country.

A second memorial from James Brownhill, the claimant, dated Jan. 12, 1802, notices, that the first pair of mill-stones of the Abbey-craig kind, were set a-going at Alloa, in May, 1800; since which time thirty-six and a half pairs had been made; that all which had been used had given satisfaction; that they had been employed in various parts of Scotland; and that one pair had been sent to Prussia.

A letter from Alexander Bald, agent for the Alloa-Mill Company, dated January 13, 1802, greatly commends the Abbey-craig Stones, and observes, that flour ground with them gives great satisfaction; that when the power of the mill is able to grind three bolls per hour
with

with French Burrs (each boll being more than four Winchester bushels) the Abbey-craig Stones will grind three quarters of a boll more each hour; and from good wheat produce one eighth more of fine-flour per boll; that they are not under the necessity of running the Abbey-craig Stones so close set as Burrs, which enables them to feed faster without bringing an extra heat upon the flour.

A letter from Mr. Erskine, dated January 15, 1802, confirms the above Certificates, and states, that he is convinced, on any fair trial, the Abbey-craig Mill-stones will be found to excel all others yet made use of; that he will direct any further experiments to be made in that neighbourhood relative to them, which the Society may suggest, as the Alloa-Mill Company are convinced that the trial will prove how deserving poor James Brownhill is of having a good reward for his ingenuity.

He further adds, that mill-stones are now built at Alloa for sixteen guineas; which

which is very nearly about one fourth the price of French Burr.

A subsequent letter from Mr. Erskine, states, that Robert Redman, Esq. Corn-Exchange, London, has been lately at Alloa Mills, and, in consequence of seeing their effects, has ordered two pair to be sent to him in London, and is to send to the Alloa Mills some Essex-wheat, to be ground there, and the produce returned to him in London.

By accounts lately received from Alloa, the Society have been informed that the manufacture of these mill-stones is carried on with great success by Mr. James Brownhill, at Alloa Mills, in the county of Clackmanan, North Britain; that he executes orders for them, addressed there, upon moderate terms; and that, from his experience as a miller, he takes care to build them of such a grain as will best suit the purposes for which they are ordered.

The

THE GOLD MEDAL and FIFTY GUINEAS were this Session voted as a Bounty to Mr. HENRY GREATHEAD, of South Shields, for a BOAT of a peculiar construction, named a *Life-Boat*, in consequence of the lives of many persons shipwrecked having been preserved by it.

Two Plates of this Boat are annexed to the following Communications on the Subject, and a Model of it is in the Repository of the Society.

S I R,

A CONSIDERABLE time has elapsed since I had the honour to lay before the Society a Model of the Life-Boat of my invention.

I have now inclosed a particular account of its construction, in a letter from Mr. Hinderwell, explaining upon
what

what principle it is built, so as to render it superior to any other form of a Boat for the dangerous enterprises for which it was intended, and has been used.

I am, SIR,

Your humble Servant,

HENRY GREATHEAD.

South Shields, Jan. 1, 1802.

TO MR. CHARLES TAYLOR.

SIR,

IT is much to be lamented, that in an age enlightened by science, such a languid indifference should prevail on many important public occasions; and that the most excellent inventions should have to combat the force of inveterate prejudice.

How many valuable discoveries have languished in obscurity! How many useful projects have perished in embryo, deprived of the fostering aid of the public

public, and the patronage of influence and authority!—In the class of useful improvements for the diminution of the dangers incident to a maritime profession, the Life-Boat, invented by Mr. GREATHEAD, of SHIELDS, has a claim to a distinguished patronage.—An experimental conviction of its great utility in saving the lives of shipwrecked seamen, and of its perfect safety in the most agitated sea, has induced me to advocate the cause with a zeal proportioned to its importance; and it is a consolatory reflexion to my own mind, that my exertions have been successful in the introduction of a Life-Boat, in the port of Scarborough, and, I trust, not unprofitable towards promoting a similar establishment in other places.—The services which have been recently performed at this port, by means of the Life-Boat, in contributing to the preservation of the lives of the *crews* of *two vessels*, more than compensate for every labour.

labour.—I am far from the ambition of aspiring to any honorary testimony on this occasion. Actuated by the purest principle of philanthropy, my sole object is the benefit of the community, and to endeavour, by ardent recommendations, to excite a spirit of emulation, in order to introduce the Life-Boat, with its invaluable properties, into more general use. I am induced to submit, with the utmost deference and respect, to the consideration of the Society of Arts, &c. the following description of the Life-Boat, with some miscellaneous observations.—The construction of the Boat, agreeably to Mr. GREATHEAD'S plan, is as follows :

The length is thirty feet ; the breadth, ten feet ; the depth, from the top of the gunwale to the lower part of the keel in midships, three feet three inches ; from the gunwale to the platform (*within*), two feet four inches ; from the top of the stems (both ends being similar) to
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the horizontal line of the bottom of the keel, five feet nine inches. The keel is a plank of three inches thick, of a proportionate breadth in midships, narrowing gradually toward the ends, to the breadth of the stems at the bottom, and forming a great convexity downwards. The stems are segments of a circle, with considerable *rakes*. The bottom section, to the floor-heads, is a curve fore and aft, with the sweep of the keel. The floor-timber has a small *rise* curving from the keel to the floor-heads. A bilge plank is wrought in on each side next the floor-heads with a double *rabbit* or groove, of a similar thickness with the keel; and, on the outside of this, are fixed two bilge-trees, corresponding nearly with the level of the keel. The ends of the bottom section form that fine kind of entrance observable in the lower part of the bow of the fishing-boat, called a *Coble*, much used in the North. From this part to the top of the
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the stem, it is more elliptical, forming a considerable projection. The sides, from the floor-heads to the top of the gunwale, flaunch off on each side, in proportion to about half the breadth of the floor. The breadth is continued far forward towards the ends, leaving a sufficient length of strait side at the top. The sheer is regular along the strait side, and more elevated towards the ends. The gunwale, fixed on the outside, is three inches thick.—The sides, from the under part of the gunwale, along the whole length of the regular sheer, extending twenty-one feet six inches, are cased with *layers* of cork, to the depth of sixteen inches downward; and the thickness of this casing of cork being four inches, it projects at the top a little without the gunwale. The cork, on the outside, is secured with thin plates or slips of copper, and the boat is fastened with copper nails. The *thwarts*, or seats, are five in number, *double banked*,

banked, consequently the boat may be rowed with ten * oars. The *thwarts* are firmly stanchioned. The side oars are short, † with iron tholes and rope grommets, so that the rower can pull either way. The boat is steered with an oar at each end ; and the steering-oar is one third longer than the rowing-oar. The platform placed at the bottom, within the boat, is horizontal, the length of the midships, and elevated at the ends, for the convenience of the steersman, to give him a greater power with the oar. The internal part of the boat next the sides, from the under part of the *thwarts* down to the platform, is cased with cork ; the whole quantity of which, affixed to the Life-Boat, is nearly seven hundred weight. The cork indisputably

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* Five of the benches are only used, the Boat being generally rowed with ten oars.

† The short oar is more manageable in a high sea than the long oar, and its stroke is more certain.

contributes much to the buoyancy of the boat, is a good defence in going alongside a vessel, and is of principal use in keeping the boat in an erect position in the sea, or rather, of giving her a very lively and quick disposition to recover from any sudden *cant* or *lurch* which she may receive from the stroke of a heavy wave. But, exclusive of the cork, the admirable construction of this boat gives it a decided pre-eminence. The ends being similar, the Boat can be rowed either way; and this peculiarity of form alleviates her in rising over the waves. The curvature of the keel and bottom facilitates her movement in turning, and contributes to the ease of the steerage, as a single stroke of the steering-oar has an immediate effect, the boat moving as it were upon a centre. The fine entrance below is of use in dividing the waves, when rowing against them; and, combined with the convexity of the bottom, and the elliptical form of the

the stem, admits her to rise with wonderful buoyancy in high sea, and to launch forward with rapidity, without shipping any water, when a common boat would be in danger of being filled. The *flaunching*, or spreading form of the boat, from the floor-heads to the gunwale, gives her a considerable *bearing* ; and the continuation of the breadth, well forward, is a great support to her in the sea ; and it has been found by experience, that boats of this construction are the best sea-boats for rowing against turbulent waves. The internal shallowness of the boat, from the gunwale down to the platform, the convexity of the form, and the bulk of cork within, leave a very diminished space for the water to occupy ; so that the Life-Boat, when filled with water, contains a considerably less quantity than the common boat, and is in no danger either of sinking or overturning. It may be presumed, by some, that in cases of high wind, agi-

tated sea, and broken waves, that a boat of such a bulk could not prevail against them by the force of the oars ; but the Life-Boat, from her peculiar form, may be rowed *a-head*, when the attempt in other boats would fail. Boats of the common form, adapted for speed, are of course put in motion with a small power ; but, for want of buoyancy and bearing, are over-run by the waves and sunk, when impelled against them : and boats constructed for burthen, meet with too much resistance from the wind and sea, when opposed to them, and cannot in such cases be rowed from the shore to a ship in distress. An idea has been entertained, that the superior advantages of the Life-Boat are to be ascribed solely to the quantity of cork affixed. But this is a very erroneous opinion ; and, I trust, has been amply refuted by the preceding observations on the supereminent construction of this boat. It must
be

be admitted, that the application of cork to common boats would add to their buoyancy and security; and it might be a useful expedient, if there were a quantity of cork on board of ships, to prepare the boats with, in cases of shipwreck, as it might be expeditiously done, in a temporary way, by means of *clamps*, or some other contrivance. The application of cork to some of the boats of his Majesty's ships* might be worthy of consideration; more particularly as an experiment might be made at a little expence, and without inconvenience to the boats; or may prevent pleasure-boats from upsetting or sinking.

The Life-Boat is kept in a boat-house, and placed upon four low wheels, ready to be moved at a moment's notice. These wheels are convenient in conveying the boat along the shore to the sea;

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but

* The Launches.

but if she had to travel upon them on a rough road, her frame would be exceedingly shaken. Besides, it has been found difficult and troublesome to replace her upon these wheels, on her return from sea. Another plan has, therefore, been adopted. Two wheels, of nine feet diameter, with a moveable arched axis, and a pole fixed thereto for a lever, have been constructed. The boat is suspended near her center, between the wheels, under the *axis*; toward each extremity of *which* is an iron pin, with a chain attached. When the pole is elevated perpendicularly, the upper part of the axis becomes depressed, and the chains being hooked to *eye-bolts*, on the inside of the boat, she is raised with the utmost facility, by means of the pole, which is then fastened down to the stem of the boat.

The Scarborough Boat is under the direction of a Committee. Twenty-four fishermen,

fishermen, composing *two crews**, are alternately employed to navigate her. A reward, in cases of shipwreck, is paid by the Committee to each man actually engaged in the assistance; and it is expected that the vessel receiving assistance should contribute to defray this expence. None have hitherto refused.

It is of importance, that the command of the boat should be entrusted to some steady, experienced person, who is acquainted with the direction of the tides or currents, as much skill may be required in rising *them* to the most advantage, in going to a ship in distress. It should also be recommended, to keep the *head* of the boat to the *sea*, as much as circumstances will admit; and to give her an accelerated velocity to meet the wave. Much caution is necessary in approaching a wreck, on account of

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* Two crews are appointed, that there may be a sufficient number ready in case of any absence.

the strong reflux of the waves, which is sometimes attended with great danger. In a general way, it is safest to go on the *lee* quarter; but this depends upon the position of the vessel; and the master of the boat should exercise his skill in placing her in the most convenient situation. The boatmen should practise themselves in the use of the boat, that they may be the better acquainted with her movements; and they should at all times be strictly obedient to the directions of the person who is appointed to the command.

The great ingenuity which has been displayed in the construction of the Life-Boat, leaves scarcely any room for improvement; but some have supposed, that a boat of twenty-five feet in length, with a proportionate breadth, would answer every purpose of a larger one. A boat of these dimensions would certainly be lighter, and less expensive; but whether she would be equally *safe*
and

and *steady* in a high sea, I cannot take upon myself to determine.

Mr. Greathead, of South Shields, the inventor, undertakes to build these boats, and to convey them to any port in the kingdom. He is a worthy man, in whom a confidence may be reposed, and will build upon moderate terms of profit.

THOMAS HINDERWELL.

TO MR. CHARLES TAYLOR.

S I R,

I HAVE duly received your letter, and am greatly obliged to you for your polite attention towards me. Inclosed is a Certificate from the Gentlemen of South and North Shields, who are respectable men, and well versed in maritime affairs. Most of them are also
known

known to Capt. Abel Chapman, an elder brother of the Trinity House, London. Capt. Reed, an elder brother of that House, whose benevolent views led him to try some experiments with one of these boats, may also be applied to.

Rowland Burdon, Esq. M. P. has authorised me to inform you, that he is in possession of certificates and documents respecting this boat, which may be referred to.

Having no regular journal of the transactions of these boats, I shall send you the principal events from some detached minutes.

They have been particularly patronised by his Grace the Duke of Northumberland. I built the Life-Boat for North Shields entirely at his expence, and he has endowed it with an annuity. I have since built another for him, which was sent to Oporto. As I am honoured with his correspondence, he also may be applied to. Besides the Life-Boats at
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the stations here, they have them now at Scarborough, Lowestoffe, Woodbridge; Montrose, and St. Andrew's, in Scotland. I am at present building one for Ramsgate; and am desired, by George Rose, Esq. M. P. to give him information respecting one for Christ Church, Hants. I am likewise applied to from Dublin, Liverpool, and other ports, concerning them.

I have been honoured with the Medallion from the Humane Society, on account of my Boat, and hope to merit the approbation of the Society of Arts.

I am, SIR,

Yours, &c.

HENRY GREATHEAD.

*South Shields,
January 12, 1802.*

TO MR. CHARLES TAYLOR.

CERTI-

CERTIFICATE FROM NORTH AND
SOUTH SHIELDS.

WE, the under-signed resident Gentlemen and Ship Owners of South and North Shields, do certify, that the Life-Boat of South Shields, built in the year 1789, and the North Shields Boat, built in 1798, were invented and constructed by Mr. Henry Greathead, of South Shields; and have, during the last eleven years, been the means of saving between two and three hundred men, from ships wrecked in the course of that time, near the Mouth of Tynemouth Haven; and as the said Mr. Henry Greathead has made his models public, we recommend him to the Society instituted for the Encouragement of Arts, Manufactures, and Commerce, as deserving not only their countenance and support, but a reward suitable to the great good that has resulted to the community from this fortunate invention.

South

South Shields.

WILLIAM MASTERMAN,
CUTHBERT MARSHALL,
HENRY HEATH,
JOSEPH WILLIAM ROXBY,
JOSEPH BULMER,
CUTHBERT HERON,
LOCKWOOD BRODRICK,
JOHN ROXBY,
ROBERT STEPHENSON,
JOHN MARSHALL.

North Shields.

JOHN WALKER,
GEORGE FRENCH,
JOHN SCOTT,
SAMUEL HURRY,
WILLIAM CLARK,
STEPHEN WRIGHT, jun.
THOMAS HEARN,
HENRY TREWHITT,
WILLIAM CLARK, jun.
JOHN FENWICK, sen.

January, 1802.

Particulars

Particulars relative to the Construction of, and Benefits received from, sundry Life-Boats, built by Mr. HENRY GREATHEAD, or under his directions, in and since the year 1789.

ACCOUNT OF THE SOUTH-SHIELDS LIFE-BOAT.

FROM the declaration of Sir Cuthbert Heron, Bart. of South Shields, it appears, that when the Adventure was wrecked in 1789, on the Herd Sands, he offered a reward for any seamen to go off to save the men's lives, which was refused; and that the greatest part of the crew of the Adventure perished within 300 yards of the shore, and in sight of a multitude of spectators. The Gentlemen of South Shields immediately met, and offered a reward to any person who would give in a Plan of a Boat, which should be approved, for the preservation

ervation of men's lives. Mr. Greathead gave in a plan, which met with approbation; a committee was formed, and a subscription raised, for the building of a boat upon that plan. After it was built, it was with some difficulty that the sailors were induced to go off in her; but, in consequence of a reward offered, they went off, and brought the crew of a stranded vessel on shore. Since which time the boat has been readily manned, and no lives have been lost (except in the instances of the crews trusting to their own boats); and, in his opinion, if Mr. Greathead's boat had existed at the time of the wreck of the *Adventure*, the crew would have been saved.

From other accounts it appears, that in the year 1791 the crew of a brig, belonging to *Sunderland*, and laden from the westward, were preserved by this Life-Boat, the vessel at the same time breaking to pieces by the force of the sea.

On

On January 1st, 1795, the ship *Parthenius*, of Newcastle, was driven on the Herd Sand, and the Life-Boat went to her assistance, when the sea breaking over the ship as the boat was ranging along-side, the boat was so violently shaken that her bottom was actually hanging loose; under these circumstances she was three times off to the ship, without being affected by the water in her.

The ship *Peggy* being also on the Herd Sand, the Life-Boat went off, and brought the crew on shore, when the plug in her bottom had been accidentally left out; though she filled with water in consequence, yet she effected the purpose in that situation.

In the latter part of the year 1796, a sloop belonging to Mr. Brymer, from Scotland, laden with bale goods, was wrecked on the Herd Sand; the crew and passengers were taken out by the Life-Boat; the vessel went to pieces at the time the boat was employed, the
goods

goods were scattered on the sand, and part of them lost.

In the same year, a vessel named the Countess of Errol, was driven on the Herd Sand, and the crew saved by the Life-Boat.

October 15th, 1797, the sloop called Fruit of Friends, from Leith, coming to South Shields, was driven on the Herd Sand. One part of the passengers, in attempting to come on shore in the ship's boat, was unfortunately drowned; the other part was brought on shore safe by the Life-Boat.

The account of Capt. William Carter, of Newcastle, states, that on the 28th November, 1797, the ship Planter, of London, was driven on shore near Tyne-mouth Bar, by the violence of a gale; the Life-Boat came out, and took fifteen persons from the ship, which the boat had scarcely quitted before the ship went to pieces; that, without the boat, they must all have inevitably perished, as the

wreck came on shore soon after the Life-Boat. He conceived that no boat, of a common construction, could have given relief at that time. The ships Gateshead and Mary, of Newcastle, the Beaver, of North Shields, and a sloop, were in the same situation with the Planter. The crew of the Gateshead, nine in number, took to their own boat, which sunk, and seven of them were lost; the other two saved themselves, by ropes thrown from the Mary. After the Life-Boat had landed the crew of the Planter, she went off successively to the other vessels, and brought the whole of their crews safe to shore, together with the two persons who had escaped from the boat of the Gateshead.

Mr. Carter adds, that he has seen the Life-Boat go to the assistance of other vessels, at different times, and that she ever succeeded in bringing the crews on shore; that he had several times observed

served her to come on shore full of water, and always safe.

ACCOUNT OF THE NORTHUMBERLAND LIFE-
BOAT.

THE Northumberland Life-Boat, so called from being built at the expence of his Grace the Duke of Northumberland, and presented by him to North Shields, was first employed in November, 1798, when she went off to the relief of the sloop Edinburgh, of Kincardine, which was seen to go upon the Herd Sands, about a mile and a half from the shore. Ralph Hillery, one of the seamen who went out in the Life-Boat to her assistance, relates, that she was brought to an anchor before the Life-Boat got to her; that the ship continued to strike the ground so heavily, that she would not have held together ten minutes longer, had not the Life-Boat arrived; they made her cut her cable, and then

took seven men out of her, and brought them on shore ; that the sea was at that time so monstrously high, that no other boat whatever could have lived in it. He stated, that, in the event of the Life-Boat filling with water, she would continue still upright, and would not founder, as boats of a common construction do ; that he has seen her go off scores of times, and never saw her fail in bringing off such of the crews as staid by their ships.

It also saved (as appears from other accounts) the crew of the brig *Clio*, of Sunderland, when she struck upon the rocks, called the Black Middens, on the north side of the entrance of Tynemouth Haven.

October 25th, 1799, the ship *Quintillian*, from St. Petersburg, drove on the Herd Sand, from the force of the sea-wind at N. E. knocked her rudder off, and was much damaged ; but the crew were brought on shore by the Life-Boat.

Boat. The great utility of this Life-Boat is also confirmed by many other recent circumstances : one among which is that of the ship Sally, of Sunderland, which, in taking the harbour of Tyne-mouth, on December 25th, 1801, at night, struck on the bar : the crew were brought on shore by the Life-Boat, but the ship was driven among the rocks.

On the 22d of January, 1802, in a heavy gale of wind, from the N. N. W. the ship Thomas and Alice, in attempting the harbour of South Shields, was driven on the Herd Sand : the Northumberland Life-Boat went to her assistance ; took, as was supposed, all the people out, and pulled away from the ship to make the harbour, when they were waved to return by a man who had been below deck. On taking this man out they encountered a violent gust of wind, under the quarter of the ship ; the ship at the same time drove among the breakers ; and, entangling the boat

with her, broke most of the oars on that side of the boat next the ship, and filled the boat with water. By the shock, several of the oars were knocked out of the hands of the rowers, and that of the steersman. In this situation, the steersman quickly replaced his oar from one of those left in the boat, and swept the boat before the sea, filled with water inside as high as the midship gunwale: the boat was steered in this situation before the wind and sea, a distance far exceeding a mile, and landed twenty-one men, including the boat's crew, without any accident, but being wet.

ACCOUNT OF THE SCARBOROUGH LIFE-BOAT.

SIR,

THE Life-Boat at Scarborough, which was built without the least deviation from the model and the plan which you sent here at my request, has
even

even exceeded the most sanguine expectations ; and I have now received experimental conviction of its great utility in cases of shipwreck, and of its perfect safety in the most agitated sea. Local prejudices will ever exist against novel inventions, however excellent may be the principles of their construction ; and there were some, at this place, who disputed the performance of the Life-Boat, until a circumstance lately happened, which brought it to the test of experience, and removed every shadow of objection, even from the most prejudiced minds.

On Monday, the 2d of November we were visited with a most tremendous storm from the eastward, and I scarcely ever remember seeing a more mountainous sea. The Aurora, of Newcastle, in approaching the harbour, was driven ashore to the southward ; and, as she was in the most imminent danger, the Life-Boat was immediately launched to

her assistance. The place where the ship lay was exposed to the whole force of the sea, and she was surrounded with broken water, which dashed over the decks with considerable violence. In such a perilous situation the Life-Boat adventured, and proceeded through the breach of the sea, rising on the summit of the waves, without shipping any water, except a little from the spray. On going upon the lee-quarter of the vessel, they were endangered by the main-boom, which had broken loose, and was driving about with great force. This compelled them to go alongside, and they instantly took out four of the crew ; but the sea which broke over the decks having nearly filled the boat with water, they were induced to put off for a moment, when, seeing three boys (the remainder of the crew) clinging to the rigging, and in danger of perishing, they immediately returned, and took them into the boat, and brought the whole to
land

land in safety. By means of the Life-Boat, built from your plan, and the exertions of the boatmen, seven men and boys were thus saved to their country and their friends, and preserved from the inevitable destruction which otherwise awaited them. The boat was not in the least affected by the water which broke into her when alongside the vessel; and, indeed, the boatmen thought it rendered her more steady in the sea. I must also add, that it was the general opinion that no other boat of the common construction could have possibly performed this service; and the fishermen, though very adventurous, declared they would not have made the attempt in their own boats.

We have appointed a crew of fishermen to manage the boat, under the direction of the Committee; and the men are so much satisfied with the performance of the boat, and so confident in her safety, that they are emboldened to
adven-

adventure upon the most dangerous occasion. I have been thus circumstantial, in order to show the great utility of the Life-Boat; and, I should think, it would be rendering an essential service to the community, if any recommendation of mine should contribute to bring this valuable invention into more general use.

I remain, SIR,

Your most obedient Servant,

THOMAS HINDERWELL.

Scarborough,
17th Nov. 1801.

TO MR. HENRY GREATHEAD,

South Shields, the Inventor of the Life-Boat.

BY other accounts, furnished to the Society, it appears that the Scarborough Life-Boat, on the 21st of November, 1801, was the means of saving a sloop belonging to Sunderland, and her

her crew, consisting of three men and boys : also the Experiment, of London, her cargo, and crew consisting of eight men and boys, when in a distressed and perilous situation, on the 22d of January last, which facts are attested by eleven owners of ships resident in Scarborough.

In the course of the last twelve years, several ships and vessels, which have not been included in the above accounts, have been driven on shore in bad weather, and got off again afterwards : the crews have been saved by being taken out by the Life-Boats, whereas, if they had remained on board, they must have perished, the sea making a passage over them.

THE Duke of Northumberland presents his compliments to Mr. Taylor, and is extremely happy to hear that the subject of the Life-Boat is before the Society. Mr. Greathead has, undoubtedly,

doubtedly, great merit ; and the Duke will be much pleased to hear that the Society considers him as deserving their notice. As the Duke cannot help feeling himself much interested on this subject, he shall be obliged to Mr. Taylor for any further communications he may please to make him relative to it.

It is with infinite satisfaction the Duke informs Mr. Taylor, that he has just received a letter from the North, to acquaint him that the Life-Boat had, on Christmas night, saved the crew of a vessel which was lost upon the rocks in one of the most boisterous nights and violent wind that was ever known.

*Northumberland-House,
Jan. 18, 1802.*

TO MR. CHARLES TAYLOR.

THESE are to certify, that the Elder Brethren of the Trinity-House, having received repeated testimonies of the
the

the utility of the Life-Boat, invented by Mr. Henry Greathead, of South Shields, in saving the lives of shipwrecked mariners, are of opinion, that the invention is of such national importance as to merit every possible encouragement.

By order of the Corporation,

(Signed) JAMES COURT.

*Trinity-House,
4th February, 1802.*

S I R,

I AM sorry it was not in my power to pay more early attention to your favour of the 15th ultimo, having ever since been so much indisposed as to be confined entirely to my bed and chamber until within the last few days. I have now the pleasure to see by the papers, that the Society have already adjudged to Mr. Greathead a handsome gratuity

gratuity for his useful and ingenious invention; a reward, of all others, in my opinion, the most deservedly bestowed, as his Life-Boat has certainly preserved many brave seamen, both at Shields and Sunderland who must otherwise inevitably have perished.

It is truly astonishing to see with what zeal and magnanimity our watermen encounter the most tremendous seas, by means of this boat, which is found to answer every purpose for which it was designed, beyond the expectations of the most sanguine; and, were its use universally adopted, the general benefit would undoubtedly soon exceed calculation.

I am, SIR,

Your most obedient Servant,

WILLIAM ORTON.

*Sunderland,
April 30, 1802.*

TO MR. CHARLES TAYLOR.

SINCE

SINCE the award of the Society's bounty to Mr. Greathead, the sum of twelve hundred pounds has been voted to him by Parliament for his Life-Boat.

He has also received other rewards on the same account from the Trinity-House, and Members at Lloyd's, which have been noticed in the public newspapers.

Description

*Description of the Engravings of Mr.
H. GREATHEAD's Life-Boat.*

PLATE V.

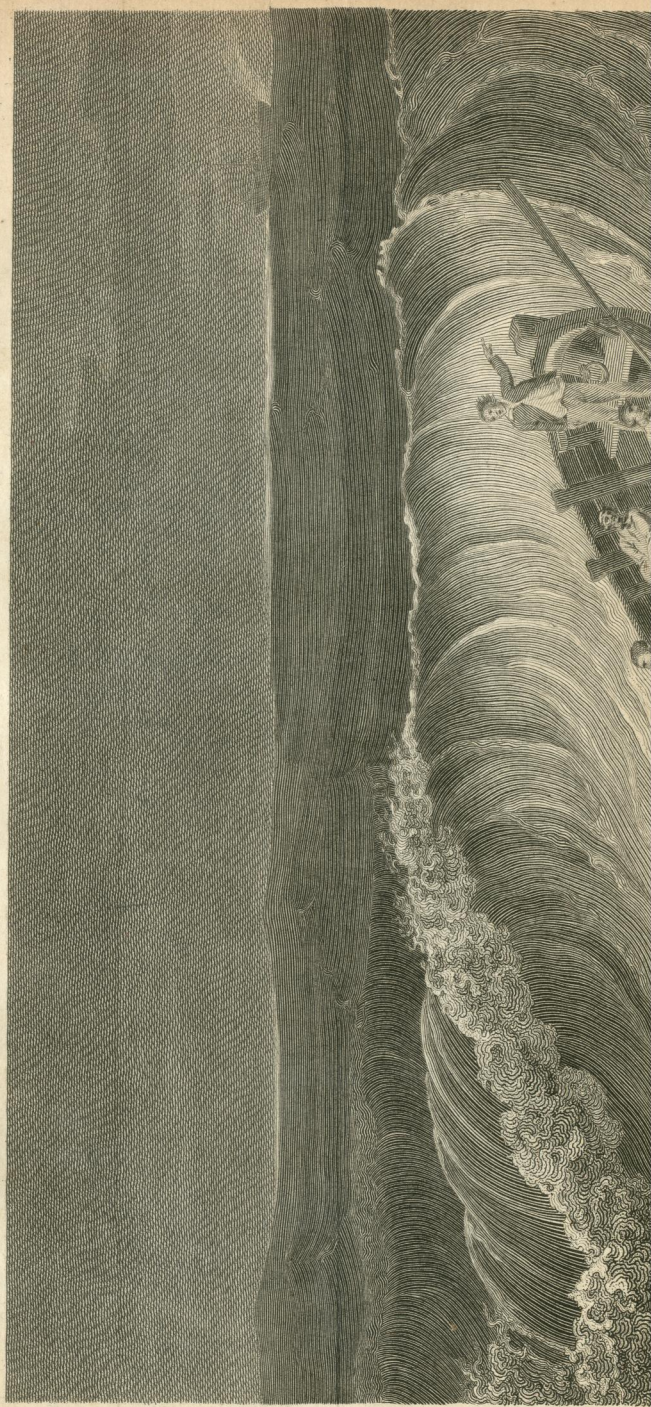
The fore part of the Engraving presents a perspective view of the Life-Boat rising over a heavy surge, and going out to the assistance of a ship, which appears at the edge of the horizon, in distress.

In the Life-Boat are ten rowers pulling along to get to the ship.

At the lower end of the boat, a man is steering her with a long oar towards the ship, whilst another person is ready with an oar, at the higher end of the boat, to steer the boat on her return ; both ends of the boat being formed alike, in order to use either at will, in going to or coming from the ship.

The sheer or curve of the boat rising considerably from the centre to the stems, or ends, is clearly distinguished ;
also

*A Perspective View of M^r. H. Greathead's Life Boat
going out to assist a Ship in Distress.*





Lowry sc

Drawn from a Model presented by Mr. Gresham to the Admiralty.

also the coating of cork, secured by slips of copper, along the outside of the boat, near the part where the rowers are seated.

N. B. It was first intended to have pointed out the particular parts of this Plate, by letters engraved upon it; but it being found that such insertions would be a disadvantage to the Engraving; and that, if any difficulties occurred, they would be clearly explained by letters in the following Plate of the sections; they have been here omitted.

Plate VI. Fig. 1. A longitudinal Section of the Life-Boat.

E E E	The sheer or curve of the boat.
I I	The two stems or ends.
K	The keel.
LL	The aprons, to strengthen the stems.

Y

MM

MM	The sheets, or places for passengers.
NN	Timber-heads, or boat-fastenings.
OOOOO	The tholes on which the oars are slung by grommets.
T	Flooring under the rowers feet.

Fig. 2. A cross Section of the Life-Boat.

F F	The outside coatings of cork.
G G	The inside cork filling.
H H	The outside planks of the boat.
I	One of the stems of the boat.
K	The keel.
NN	The timber-heads.
P	The thwarts, or rowers seats.
R	One of the stanchions under the thwarts, each being thus firmly supported.
S	A section of the gang-board, which crosses the thwarts, and forms the passage from one end of the boat to the other.

T The

- T** The floor-heads, or platform
for the rowers feet.
- V V** The two bilge pieces, nearly
level with the keel.
- W W** The gunwales.
- X** A ring-bolt for the head-fast,
there being another also at
the other end.
- Y** Platform for the steersman.

*Fig. 3. A Truck or Carriage with four
Wheels, to convey the Boat to and from
the Sea.*

- a** An oblong frame of wood, con-
sisting of two long pieces,
hollowed a little to admit
the body of the boat, and
secured by the cross pieces,
b b.
- cccc** Four low wheels, each sunk or
hollowed in the middle, to
run better upon a rail-way
or timber-road.

- dd Two indents made in the side-timbers, that the bottom of the boat may lie firm therein.
- ee Two small rollers, moveable, in the cross timbers, for the keel of the boat to slide upon.
- ff Two long rollers one at each end of the frame, to assist in raising the boat upon or sliding it off the truck or carriage.

Management of the Life-Boat, from the Boat-House to the Sea, and vice versâ, as practised at Lowestoffe, in Suffolk.

THE Life-Boat may be launched from any beach, when wanted, with as much ease as any other boat, by proper assistance. The distance from the boat-house, at Lowestoffe, to the shore, is one hundred yards, and the boat's crew can run her down in ten minutes.

When

When the sea does not tumble in upon the beach very much, the boat may be easily launched by laying the ways as far as possible in the water, and hauling the carriage from under her.

When there is a great sea on the beach, the boat must be launched from the carriage before she comes to the surf, on planks laid across, as other boats are launched; the people standing on the ends to prevent the sea moving them; then, with the assistance of the anchor and cable (which should be laid out at sea for the purpose), the boat's crew can draw her over the highest sea.

Upon the boat returning to the shore, two double blocks are provided; and, having a short strop fixed in the hole, in the end of the boat next the sea, the boat is easily drawn upon the carriage. The boat's crew can run her any distance upon a clear shore by the carriage of Mr. Greathead's contrivance.

*Account of, and Instructions for, the
Management of the Life-Boat.*

THE Boats in general of this description are painted white on the outside, this colour more immediately engaging the eye of the spectator at her rising from the hollow of the sea, than any other. The bottom of the boat is at first varnished (which will take paint afterwards), for the more minute inspection of purchasers. The oars she is equipped with are made of fir, of the best quality, having found by experience that a rove-ash oar that will dress clean and light, is too pliant among the breakers; and when made strong and heavy, from rowing double banked, the purchase being short, sooner exhausts the rower, which makes the fir oar, when made stiff, more preferable.

In the management of the boat, she requires twelve men to work her; that
is.

is, five men on each side, rowing double banked, with an oar slung over an iron thole, with a grommet (as provided) so as to enable the rower to pull either way; and one man, at each end, to steer her, and to be ready at the opposite end to take the steer oar, when wanted. As, from the construction of the boat, she is always in a position to be rowed either way, without turning the boat, when manned, the person who steers her should be well acquainted with the course of the tides, in order to take every possible advantage: the best method, if the direction will admit of it, is to head the sea. The steersman should keep his eye fixed upon the wave or breaker, and encourage the rowers to give way, as the boat rises to it; being then aided by the force of the oars, she launches over it with vast rapidity, without shipping any water. It is necessary to observe, that there is often a strong reflux of sea, occasioned by the stranded

wrecks, which requires both dispatch and care in the people employed, that the boat be not damaged. When the wreck is reached, if the wind blows to the land, the boat will come in shore without any other effort than steering.

I would strongly recommend practising the boat, by which means, with experience, the danger will appear less, from the confidence people will have in her from repeated trials. -

HENRY GREATHEAD.

*South Shields,
October 13, 1802.*

S I R,

I SHALL have a complete model of my Life-Boat, on the scale of one inch to a foot, ready to send to the Society in a little time; and it having been much desired that the Life-Boat might be brought into general use, for ships, (in which case, it is a great object to have
her

her to sail), I have, in a model lately made, adopted the sliding keel (an improvement of the Dutch Lee-Board), with the addition of one of them at one end sliding angular, so as to correspond with the keel of the rudder, at any depth. This angular sliding keel is entirely new: I have shewn the improvement to several nautical men, who highly approve of it. I shall finish the model for the Society in the same manner.

The keels and rudder are attached in such a manner, that she can be easily divested of them, when necessary, and will then be the exact form of the original Life-Boat. I should have sent you the model before this time; but the orders for Life-Boats have been so numerous, and so generally pressing, that I have not yet had time to execute it.

The Life-Boats I lately sent to Whitby and Redcar, have recently been the means of saving the lives of many persons, from ships wrecked, who must otherwise

otherwise have perished; for the particulars of which, I refer you to the Newcastle Chronicle of the 11th instant, which I hope will be satisfactory to the Society, to whom I shall be very happy, on all occasions, to transmit my improvements.

I remain, Sir,

Your obliged and obedient Servant,

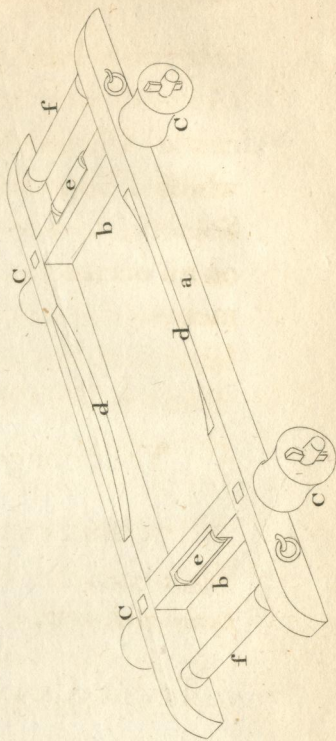
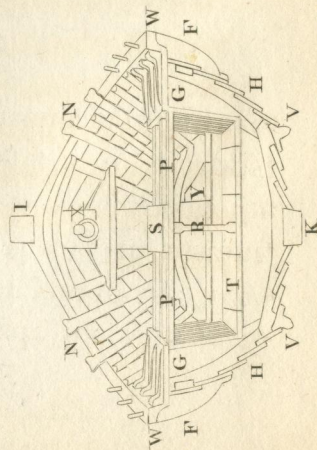
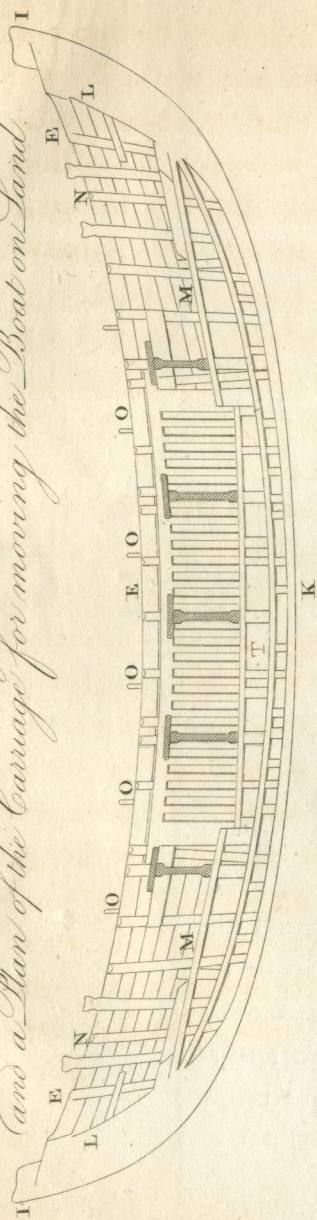
HENRY GREATHEAD,

*South Shields,
December 17, 1802.*

TO MR. CHARLES TAYLOR.

The

Sections of Mr. Greathead's Life Boat
(and a Plan of the Carriage for moving the Boat on Land.

*lowry sculp*

The GOLD MEDAL of the Society was this Session voted to WILLIAM HALL TIMBREL, Esq. of Streatly, in Berkshire, for an improved HERNIARY TRUSS, and new-invented CALICO CUSHION. The following Account and Certificates were received from him. A Model of part of the Human Body, and the Trusses from which the annexed Engravings are taken, were presented by him to the Society, and are placed in their Repository.

SIR,

I DESIRE you will present to the Society of Arts, &c. a Model of part of the Human Body, to which I have applied the instrument called a Truss, for the purpose of effectually keeping up inguinal and scrotal ruptures; also, my new invention, the Calico Cushion. You
will

will please to observe, that this subject is not introduced to the Society, as arising from medical or surgical ideas; but for the purpose, by mechanical means, of causing relief to many afflicted persons, and assisting the cause of humanity. It is with this view I bring forward the model and my inventions, and not for the sake of any premium or bounty from the Society.

I am, Sir,

Your humble Servant,

WILLIAM HALL TIMBREL.

May 12, 1802.

To MR. CHARLES TAYLOR.

S I R,

I BEG leave to explain the nature of those improvements in the Truss and Cushion, which I have had the honour of presenting to the Society of Arts, &c. Many of my suggestions are new. The whole

whole system of immobility, and the combination of mechanical action, to produce sufficient pressure on the aperture, or ring of the abdomen, are decidedly so, as well as the formation of the Cushion of Calico.

The hoop or spring part of the Truss is formed in an exact circular line with the pad. The pad is broad, and nearly, though not entirely flat; its neck is short, to lie in the hollow of the groin; for, if the neck touched the thigh, the Truss would move and the rupture descend.

Not much edging of leather projects from the hoop, and but little stuffing is put on the inside, as it lessens the elasticity of the spring. A double truss should be united behind, by a strap and buckle, to let out or take in; and both the front and hind straps should be sewed nearly one inch backwarder than usual. These straps should also be lined and edged, to increase their power of action. I have substituted a buckle, and its
double

double tongue received in a groove, for the usual brass knob on the pad of the Truss, which buckle, with the thigh-strap, firmly fixes the lower part of the pad against the body.

The thigh-strap is made of wash-leather, stitched and lined with tape, to prevent its stretching; and the end adjoining the buckle, is made of neat's leather.

This thigh-strap, the sewing-thread being doubled, twisted, and well waxed, is looped over the hoop part of the Truss, and in two lines of sewing is fixed thereto.

It is material to attend to the place of fixing the thigh-strap, which should be about one inch behind the great *trochanter*, or lower hip-bone, and in such a manner as to have a fair pull. This place cannot be exactly ascertained, till the Truss is tried on the patient.

The necessity of properly fixing the thigh-strap on the hoop, to keep up the rupture, must be apparent; because,
when

when the belly pushes against the pad, under B, the sewing at A, draws B close to the body. (*See the Engravings*).

No Truss can be permanently retained in its place, without a thigh-strap; but sometimes it may be useful to line it on the inside with soft flannel, in order to prevent its chafing the thigh.

I will now add the description and uses of the Cushions of coarse Calico, CC, and the instructions how to form one; first observing, that calico has elastic and adhesive properties, which do not exist in linen or flannel.

Cut or tear a slip of coarse calico, about twelve inches in length, and for adults, three inches in breadth; fold it into a square, of a size that will project a quarter of an inch round the edges of the pad of the Truss, except that end next the thigh, which should have no projection beyond the neck of the pad. The rough edges of the cushion are worn upwards and downwards. Over the first
slip

slip many others are folded, to the thickness of about three quarters of an inch; but the thickness must be regulated by the size of the patient. When the hollow in the groin is completely filled up, and the cushion quite immoveable, it is properly formed.

This Calico Cushion is to be worn under the pad or pads BB, of the Truss, as at CC and from time to time; an outer slip or two may be changed at pleasure, for the purposes of cleanliness, or restoring the cushion to a proper degree of thickness.

This cushion, when judiciously made, even with a bad Truss, if it is in a line with the aperture, will materially assist in keeping up a reducible rupture.

The properties of the Calico Cushion are,

First, that it protects the spermatic cord from being injured by the hard pad of the Truss; which injury, in common trusses, often produces hydrocele, inflammation

inflammation of the spermatic vessels, hernia humoralis, &c. &c.

Secondly, by protecting the spermatic vessels from the injuries of pressure, it fulfils a *desideratum* never before obtained. It enables the patient to girt the Truss round the body with such an effective degree of tightness, that the rupture cannot descend.

Thirdly, by uniting the properties of softness and solidity, it yields to the form of the abdomen, and thus completely fills up the aperture, or ring, in the external oblique abdominal muscle, through which the rupture descends.

Fourthly, it affords an additional column of pressure ; and the Truss being tightly fastened, keeps the omentum and intestines, all round and above the aperture, in a state of quietude, preventing any internal or partial descent of the bowels, &c.

It is necessary to repeat, that this Cushion, to obtain all its advantages,

Z

must

must be formed of separate slips, folded over each other, and not of one piece of calico.

The method which I have used of placing the Truss, is in an exact circular line round the body, directly above the fissure of the posteriors ; and the edge of the hoop part lodging on, over and above the great trochanter, and below the margin of the hip-bone, will keep the pad or pads of the Truss on the abdominal ring, producing ease, effect, and immobility.

The Truss, worn in the manner I describe, is not to be seen through the clothes, and it retains its elasticity a greater length of time than the old spiral trusses.

When the double Truss is put on, it should be pulled so very tight as to make the flesh between the two pads rise to the thickness of the fore finger ; there will be no pain, for the pressure is only

only where it ought to be, immediately under the pad or pads of the Truss.

The thigh-strap also must be sufficiently short, and pulled close to the flesh, to have its action on B.

A single Truss will have the same action for a single rupture, by using the same methods.

By minutely following the above instructions, the reducibly ruptured patient may be freed from pain or danger.

I have the honor to be, Sir,

Your most humble Servant,

WM. HALL TIMBREL.

December 7, 1802.

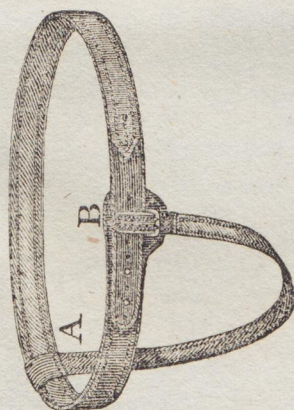
Certificates have been received from Mr. William Blair, Great Russel-street, Bloomsbury-square, and Mr. Thomas

Z 2

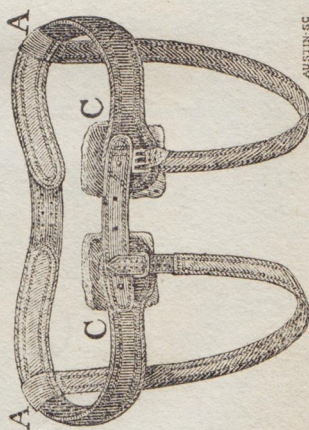
Payne,

Payne, Brook-street, Members of the Royal College of Surgeons, in London, confirming, by cases in their practice, the utility of the improved Trusses and Cushion, recommended by Mr. Timbrel.

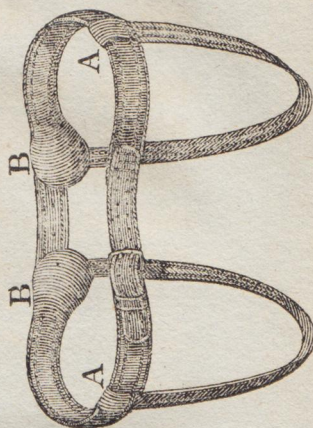
Improved Trusses by Mr. Timbrel.



*Single
Trusses.*



*Double
Trusses.*



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